

Hampton Beach State Park



Flagship Beach Report



BACKGROUND

The Beaches Environmental Assessment and Coastal Health (BEACH) Act is an amendment to the Clean Water Act. The purpose of the BEACH Act is to reduce the risk of disease to users of the nation's coastal recreational waters. The BEACH Act authorizes the United States Environmental Protection Agency (EPA) to award grants to eligible states. BEACH Act grants provide support for development and implementation of monitoring and notification programs that reduce potential exposure to pathogenic microorganisms in coastal recreation waters.

EPA New England developed a Clean Beaches Initiative for New England states (www.epa.gov/ne/eco/beaches). The Clean Beaches Initiative's goal is to better protect public health by reducing beach closures. One way in which states will accomplish this goal is to establish "Flagship Beaches". Flagship Beaches were selected by coastal New England states in 2002. They were selected based on several factors: popularity, bather volumes, historical advisories or closures, and pollution sources. These beaches will develop enhanced monitoring and notification programs through federal funding in an effort to reduce beach closures and protect public health. Flagship beaches will lead by example and serve as models for beach management and protection.

The New Hampshire Department of Environmental Services (DES) nominated Hampton Beach State Park in Hampton to serve as the Flagship Beach for New Hampshire. Hampton Beach is often the first beach that comes to mind when one thinks of New Hampshire's seacoast. Hampton Beach has the only seacoast boardwalk in New Hampshire. It has numerous shops, restaurants, hotels, and entertainment. These attractions lure thousands of daily visitors to the State Park and the Town of Hampton and make Hampton Beach one of New Hampshire's premier summer tourist attractions.

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Beach Overview

Hampton Beach State Park has been operated as a public beach since 1935. An estimated 100,000 people visit the park each year. Hampton Beach is located just over the Massachusetts border and less than an hour ride from the Maine border. North Beach, located on the northern side of Great Boar's Head, is also considered part of Hampton Beach State Park. Refer to Figure 1 for a detailed image of Hampton Beach State Park and a detailed image of North Beach can be found in the North Beach annual report.

The State Park and Town of Hampton coordinate a variety of activities during the summer months. There is the annual master sand sculpting competition, the Hobie Cat Regatta, Miss Hampton Beach Pageant, Seafood and Children's festivals, nightly entertainment at the Seashell Stage, and weekly fireworks displays. The aesthetic qualities combined with a great variety of family oriented activities make Hampton Beach the most popular attraction on the seacoast.

Hampton Beach's popularity demands that DES gives a priority to healthy water quality. Not only do beach goers participate in the above activities, but they also enjoy swimming, surfing, and other water-contact activities. The DES Beach Program has adopted strict water quality standards for public beaches. When state standards are exceeded, bacteria advisories are posted. DES has monitored the bacterial water quality of Hampton Beach State Park since 1986. Hampton Beach has never been issued a bacteria advisory. The water quality at Hampton Beach has remained relatively unchanged throughout the years. The average Enterococci concentration since 1992 (prior to that fecal coliform was measured) is 7.2 counts/100 mL.

Although the water quality at Hampton Beach has remained stable, the surrounding area has dramatically changed. The area surrounding Hampton Beach has become increasingly urbanized. Urbanization results in increased impervious surface areas which poses a number of threats to water quality through nonpoint sources of pollution. Increased runoff, sewer overflows, septic failure, and boat sewage are all threats to Hampton Beach. The Beach Program will work cooperatively with beach managers, municipalities, and the public to identify and reduce potential pollution sources that will better protect public health at our Flagship Beach

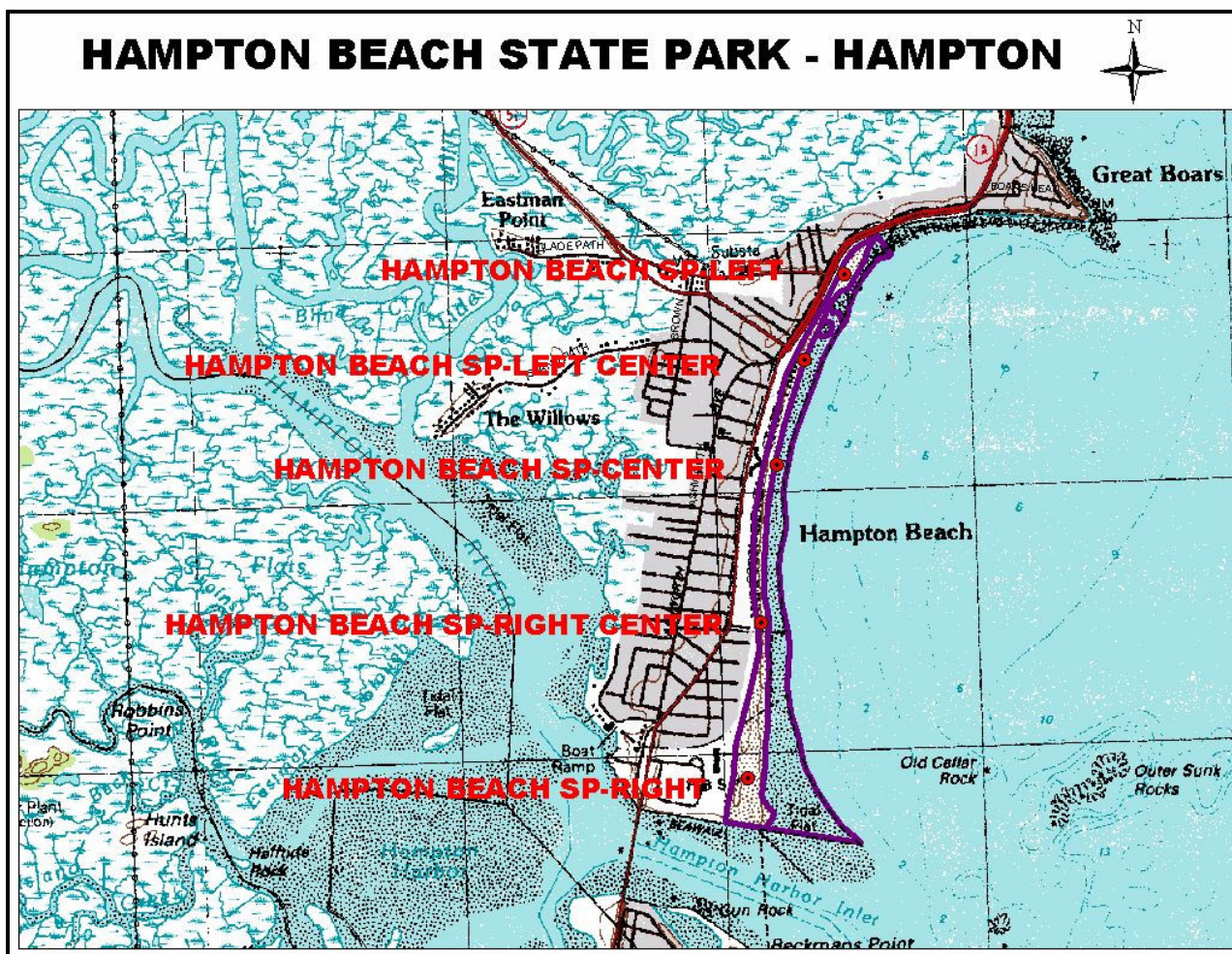


Figure 1. Hampton Beach State Park, Hampton, New Hampshire

Beach Water Quality Monitoring

As part of the Beach Program workplan a risk-based beach evaluation process and a tiered monitoring approach was developed and implemented during the 2003 beach season. Beach evaluations were conducted to determine potential health threats to the public. Evaluations are based on several criteria in three main categories: beach history, microbial pathogen sources, and beach use. Based on these criteria, beaches are assigned either Tier I – Impaired, Tier I or Tier II statuses. Tier I – Impaired beaches are considered highest priority beaches and were listed as impaired per EPA’s 305(b)/303(d) Consolidated Assessment and Listing Methodology (CALM). Tier I beaches are high priority beaches that have an increased potential to affect public health while Tier II are low priority beaches that have less potential to affect public health. Beach sample frequency is based on Tier status; Tier I – Impaired beaches are sampled twice per week, Tier I beaches are sampled once per week, and Tier II beaches are sampled once every other week.

The number of samples collected at each beach is a function of beach length. Beaches less than 100 feet in length are sampled at left and right locations 1/3 of the distance from either end of the beach. Beaches greater than 100 feet in length are bracketed into thirds and sampled at left, center and right locations. Routine sample collection may be enhanced by sampling known pollution sources to the beach area. Storm event sampling may be conducted at beaches where wet-weather events are expected to affect beach water quality.

Beaches are monitored to ensure compliance with state water quality standards. Marine waters are analyzed for the presence of the fecal bacteria Enterococci. Enterococci are known as indicator organisms, meaning their presence may indicate the presence of pathogenic bacteria. The state standards for Enterococci at public beaches is 104 counts/100 mL in one sample, or a geometric mean of 35 counts/100 mL in three samples collected over sixty days. Standard exceedances require the issuance and posting of a beach advisory. Beach advisories remain in effect until subsequent beach sampling indicates that Enterococci levels are within the state standards for designated beaches.

2006 Water Quality Data

Hampton Beach is over one mile long and requires the collection of at least three samples at left, center, and right stations. Two additional sample stations were added before the 2004 season. The stations occur between the right and center stations and the left and center stations (Figure 1). The following is a brief description of sample stations (Table 1).

Table 1. Hampton Beach Sample Station Descriptions

Description	Latitude	Longitude
Right: The right sample station is located at the southernmost section of the beach where the official State Park entrance is located. The beach area is sandy with a rock jetty separating the beach area from the mouth of the Hampton River. Lifeguards are present during the daily operation hours. There are bathhouses, a covered picnic area, a small store, and RV camping here.	42° 53' 54.306"	70° 48' 40.0123"
Right Center: The right center sample station is accessed from Haverhill Street off of Route 1A. Park at the end of Haverhill Street next to Oceanside Condominiums. Walk out to the beach and collect ocean sample in front of the storm drain. If the storm drain is flowing collect samples from both the ocean and the storm drain flow.	42° 54' 13.2"	70° 48' 36.6"
Center: The center sample station is located directly in front of the Main Park Office. The beach area is sandy and has a small boardwalk access. Lifeguards are on duty during daily operation hours. There are bathhouses located in the Main Office along with the Seashell Stage area.	42° 54' 33.295"	70° 48' 34.4954"
Left Center: The left center sample station is located off of Route 1A. Park near the New Hampshire Marine Memorial Statue and collect sample in front of the statue.	42° 54' 46.1"	70° 48' 28.3"
Left: The left sample station is on the northernmost section of the beach close to an area known as Great Boar's Head. The beach area is sandy and the sample is collected on the left side of a rock jetty. There is metered parking across the street, and numerous beach entrances.	42° 54' 56.8932"	70° 48' 22.6826"

The 2006 season's weather can best be described as unpredictable. During the month of May New Hampshire experienced flood conditions typical of a 100-year flood, while the months of June and July were wetter and warmer than normal, and August was unseasonably cool and dry. May experienced over 17 inches of rain, setting a record high for the month, and over eight inches of rain fell during June (as recorded at Pease International Tradeport, Portsmouth, N.H.). Precipitation was recorded on 34 days of the 95 day sampling season. Twenty-two beach days were directly affected by precipitation. There were a total of 26 routine inspections performed and 130 samples collected in 2006.

Table 1 includes Enterococci data from each sampling event in 2006. Enterococci levels remained low throughout the season. Figure 2 depicts the relationship between the state standards for designated beaches to the regular season beach Enterococci data. Enterococci levels did not approach the state standard of 104 counts/100 mL during the regular season. On June 22, the left station Enterococci level was elevated. Inspection data did not indicate a specific source of Enterococci; however, the left end of Hampton Beach often experiences an abundance of seaweed washed up onto the shore. Seaweed can harbor bacteria and contribute to beach Enterococci levels. Other potential sources of Enterococci to Hampton beach include high

bather loads, as a result of warmer weather in June and July and a high congregation of waterfowl documented at Hampton Beach State Park.

State Park management was once again proactive in removing trash and maintaining sanitary conditions at the beach. The Adopt-a-Beach Program continued throughout the 2006 season and was successful in performing monthly beach clean-ups. Maintaining a clean beach is an effective way to reduce waterfowl and associated fecal matter while reducing bacteria levels in the water.

Water quality did not appear to be negatively affected by the higher than normal precipitation. There was no direct relationship between area precipitation data and Enterococci levels at Hampton Beach. DES will continue to compare daily rainfall data to Enterococci concentration at Hampton Beach State Park.

Table 2. Hampton Beach State Park 2006 Enterococci Data

Sample Date	Station Name	Results (counts per 100 mL)
5/30/2006	Hampton Beach-Left	5
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
6/7/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
6/8/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	20
	Hampton Beach-Center	40
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
6/13/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
6/15/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	5
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	20
6/19/2006	Hampton Beach-Left	5
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10

6/22/2006	Hampton Beach-Left	100
	Hampton Beach-Left Center	10
	Hampton Beach-Center	60
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
6/28/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	5
	Hampton Beach-Right	10
6/29/2006	Hampton Beach-Left	5
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	40
	Hampton Beach-Right	10
7/3/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	5
	Hampton Beach-Right	10
7/10/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	5
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
7/11/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	5
	Hampton Beach-Right	10
7/19/2006	Hampton Beach-Left	5
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
7/20/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	20
	Hampton Beach-Right Center	20
	Hampton Beach-Right	10
7/25/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	30
	Hampton Beach-Right	10

7/27/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
8/2/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	5
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
8/3/2006	Hampton Beach-Left	5
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
8/9/2006	Hampton Beach-Left	20
	Hampton Beach-Left Center	20
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
8/10/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	40
	Hampton Beach-Right	10
8/14/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	5
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
8/16/2006	Hampton Beach-Left	30
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	5
	Hampton Beach-Right	10
8/21/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	80
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
8/23/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	40
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10

8/30/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	5
	Hampton Beach-Center	10
	Hampton Beach-Right Center	10
	Hampton Beach-Right	10
8/31/2006	Hampton Beach-Left	10
	Hampton Beach-Left Center	10
	Hampton Beach-Center	10
	Hampton Beach-Right Center	5
	Hampton Beach-Right	10

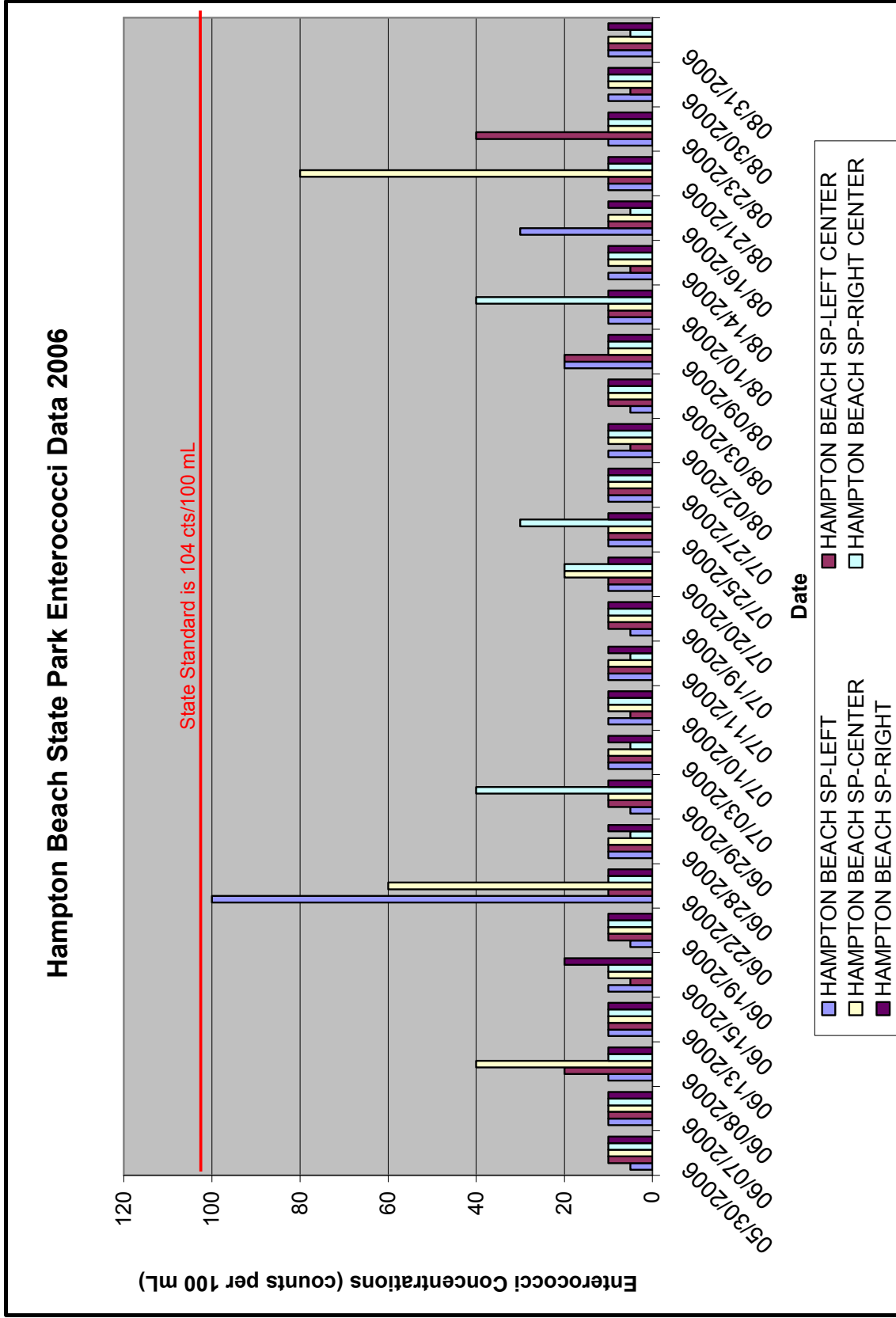


Figure 2. Hampton Beach State Park Enterococci Data 2006

Hampton Beach Adopt-a-Beach Program

In response to growing concern over the amount of litter and marine debris impacting the aesthetics of Hampton Beach, the Beach Program partnered with the Blue Ocean Society for Marine Protection from Portsmouth, N.H. In the spring of 2005, the two partners met to discuss the development of an Adopt-a-Beach Program at Hampton Beach. The Blue Ocean Society agreed to add Hampton Beach to their Adopt-a-Beach Program and the Beach Program agreed to supply all necessary materials for adopting Hampton Beach.

Hampton Beach is in excess of 1 mile long and one group of volunteers could not be expected to scour the entire beach length. Beach Program personnel divided Hampton Beach into five ¼ mile sections, Sections A through E. Figure 3 represents the Hampton Beach sections available for adoption. Beach Program personnel went to work recruiting volunteers. DES press releases were successful in increasing awareness and interest from the local community. All sections of Hampton Beach were again adopted in 2006.

Volunteers conducted beach clean-ups once per month in their section and recorded items found on data cards. The litter is discarded into trash bags and weighed at the end of the clean up. The items recorded on data cards are tallied and sent to the Blue Ocean Society where the data are entered into spreadsheets. Table 2 represents the total number of items collected from January through October in sections “A” through “D”. The most numerous items found were cigarette butts, plastic bottles (beverage, food, and other), metal cans, straws, and plastic bags (both > 1m and < 1m). Also noted, but not recorded on the data cards, were firework casings. Firework casings were again a popular item collected at the beach, especially after the Fourth of July when 255 pieces of firework related trash was collected. Construction debris was also noted several times as well as a Christmas tree and miscellaneous items. The combined weight of trash collected was 2,117 pounds.

These data do not include the amounts of litter collected for the International Coastal Cleanup (ICC), which Blue Ocean organized this year as part of a program sponsored by the Ocean Conservancy. A total number of 396 volunteers collected an additional 458 pounds of trash from Hampton Beach including 40,582 cigarette butts! Information about this event can be viewed at the Blue Ocean website, www.blueoceansociety.org.

The Adopt-a-Beach Program was once again a success in 2006. The Beach Program also teamed up with the New Hampshire State Parks, Blue Ocean Society, and the New Hampshire Coastal Program to initiate a “Carry It Don’t Bury It Campaign.” The campaign was targeted at reducing cigarette butt litter on our coastal beaches. Cigarette butts are the number one item collected during beach clean-ups and are a threat to our coastal resources. The campaign also encourages the public to carry out all trash and dispose of it properly; not on our beaches. Part of the campaign involved placing cigarette butt receptacles along all access points to coastal beaches. The receptacles were successful in encouraging proper butt disposal and will be continued in the future. Several press releases were made and future educational initiatives are underway.

Table 3. Hampton Beach Adopt-a-Beach Clean Up Data January - October 2006

Section	Gloves	Net > 5 Mesh	Traps And Pots	Floats And Buoys	Fish Line	Rope > 1m	Condoms And Tampons	Metal Bev. Can	Glass Bev. Bottle	Balloon	Six Pack Ring	Straws	Plastic Bags	Straps	Plastic Bottles	Cigarette Butts	Styrofoam Cups
A	1	5	10	3	6	23	7	201	20	14	6	156	55	0	134	5,584	28
B	0	0	0	0	0	0	1	32	7	0	0	53	8	0	3	651	0
C	3	5	0	1	4	6	0	128	60	0	3	218	92	3	228	6,672	104
D	27	10	5	17	19	102	32	182	92	27	4	192	445	5	572	13,265	90
E	4	3	31	5	8	64	6	76	22	17	2	105	78	0	109	1,559	33
Totals	72	71	100	24	53	250	56	1194	451	91	49	1338	840	131	2103	28,708	691

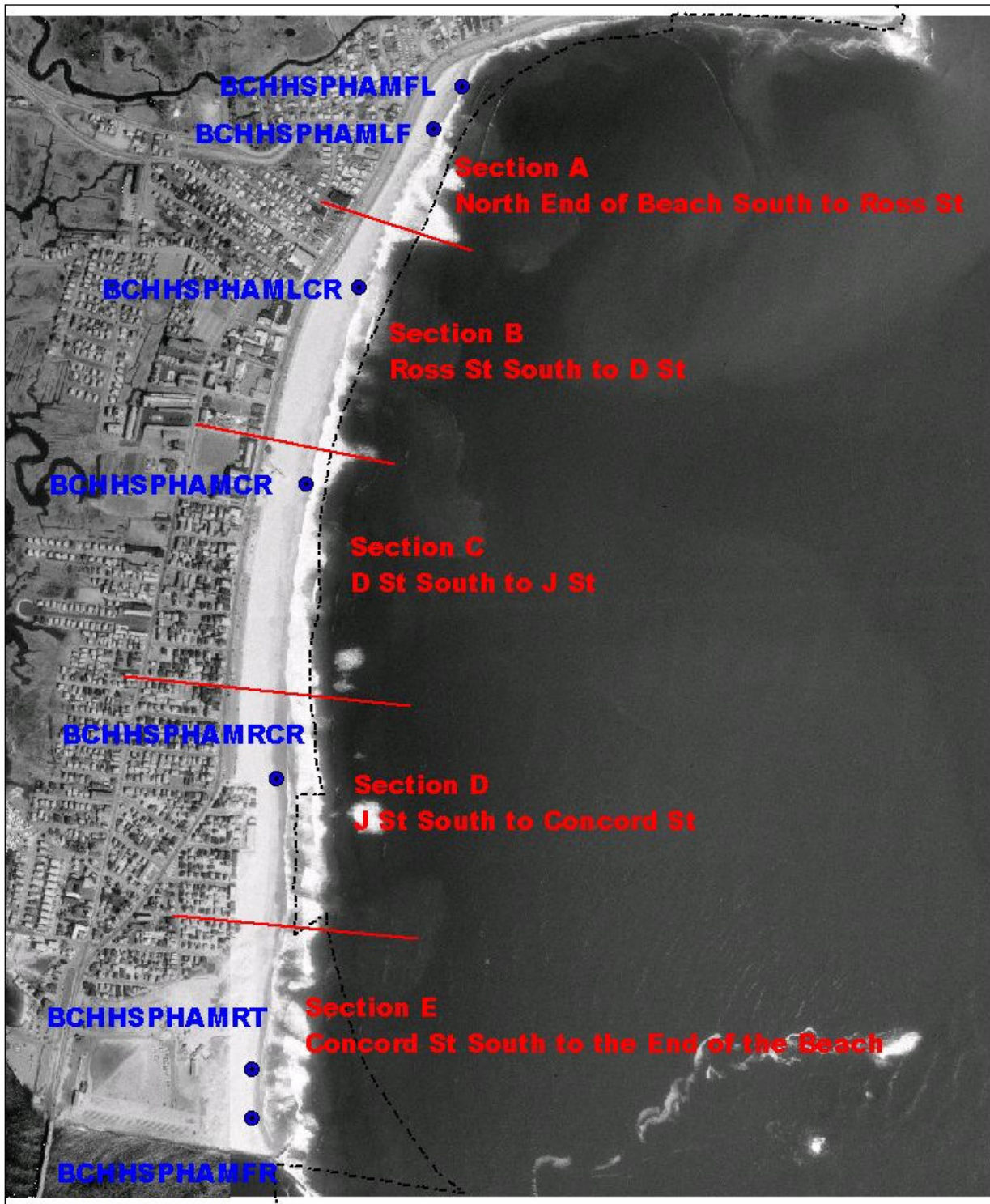


Figure 3. Hampton Beach Adopt-a-Beach Sections

Flagship Beach Accomplishments

The Clean Beaches Initiative was launched in 2002 with Flagship Beach nominations and recognition. The 2006 season marked the fourth year of Flagship Beach monitoring. The DES Beach Program continues to work cooperatively with Hampton Beach State Park to protect public health for those recreating at the beach. Accomplishments in 2006 include:

- Risk-based beach evaluations are conducted annually to identify potential bacteria sources to the beach, assess beach use, and determine beach importance to residents and the local economy.
- As previously mentioned, an Adopt-a-Beach Program was established at Hampton Beach State Park. The program successfully removed 2,117 pounds of litter from Hampton Beach in 2006.
- The DES Beach Program, NH State Parks, NH Coastal Program and the Blue Ocean Society partnered to initiate a “Carry It Don’t Bury It” campaign at coastal state parks. The campaign encouraged the public to properly dispose of cigarette butt litter and to carry out their trash generated on the beach.
- Informational kiosks were displayed at the park to inform the public about pertinent beach issues including water quality, safety, and Adopt-a-Beach program.
- Signs encouraging the public to “Pick Up Your Pet’s Waste” and “Don’t Feed the Waterfowl” were displayed at various beach access points. The signs increased public awareness of the issues and were deemed a success by Park Management and the public.

Hampton Beach State Park Access Points

Access Point
Bathroom Site
State boundary
County boundary
Town boundary
Text
Town Names



Figure 4. Access Points to Hampton Beach State Park, Hampton ,NH

Future Goals

The DES Beach Program, Hampton Beach State Park, and the Town of Hampton will combine efforts to promote healthy beach quality at Hampton Beach State Park. Future Flagship Beach goals include:

- Install pet waste stations providing dog walkers with bags to pick up their pet's waste. The stations also include signage and a waste receptacle where the public can dispose of the waste.
- Establish two new sampling stations at North Beach between the left and center, and right and center stations.
- Conduct GIS assessments during wetfall events to determine beach bacteria loading.
- Continue to post beach *Open* signs at all access points for Hampton Beach State Park. Half of the access points currently have signs posted; DES plans to post the remainder during the 2007 season. An exceedance of the enterococci standard for public beaches would result in advisory signs posted over the *Open* signs.
- GPS all *Open* sign placement to provide park management with a guide to where advisory sign postings are required during a beach advisory event.

Observations and Recommendations

- Results from beach clean up activities indicate that fireworks casings are often found littering the beach. Weekly firework displays are set off from the main beach area. DES recommends an alternate location to hold weekly fireworks displays. One area that may be considered is the southern end of Hampton Beach at the State Park quarters. There is a large gravel/grass visitors parking area that might facilitate a fireworks displays. Or, simply remove firework casings from the beach area immediately after the event.
- Hampton Beach State Park is under excellent management and is a role model for coastal beaches. We applaud DRED for their diligent efforts to maintain a safe and healthy beach environment.

Appendix A

Special Topic 2006

Rapid Assessment Methodology for the Detection of Microbiological Indicators

To assess beach water quality, the Department of Environmental Services (DES) monitors fecal indicator bacteria levels at coastal beaches on a routine basis.

Unfortunately, results from sample analysis can take anywhere from 24 to 48 hours. Because it takes at least 24 hours to receive results, beach managers and the public are not informed of water quality problems until after the public may have been exposed. This is an issue facing beach officials throughout the world,



and is a priority of the US Environmental Protection Agency (EPA). The EPA, universities and private entities are researching rapid assessment methods to enumerate bacteria and viruses. These methods will allow beach officials to post advisories on the same day water quality is impaired, thus, better protecting public health. There are three different rapid assessment method technologies available: Molecular surface recognition, nucleic acid detection and enzyme/substrate based methods. All rapid assessment methods will take less than two hours to obtain results.

Molecular surface recognition methods capture and/or label the target bacterium by binding to molecular structures on the exterior surface or in its genetic material. Analyses of coastal beach water samples currently employ culture-based methods for the detection of Enterococci bacteria, an indicator for fecal pollution in marine water. The quickest culture-based method takes up to 24 hours to provide results. Now, a new method is being developed to enumerate Enterococci. This new method uses Transcription-Mediated Amplification (TMA) with a fluorescently-labeled probe to amplify a specific region of Enterococci ribosomal RNA (rRNA).

The TMA rapid assessment method is currently being tested in Southern California. Method development is moving quickly and will likely come to execution within five years. Method cost is a significant reason the new technology is not currently employed. Once this procedure is widely and routinely accepted, the expenses should lower. This rapid assessment method is very beneficial as it will allow beach managers to take immediate action towards protecting the public from waterborne pathogen exposure on the same day water is sampled.

Another rapid assessment method being developed for fecal indicator detection is Quantitative Polymerase Chain Reaction (QPCR). QPCR is a nucleic acid detection method that targets genetic material of bacteria, viruses or protozoan indicators. QPCR is used to test for both *E. coli* and Enterococci. Results can be obtained from this method on an average of two hours after sampling. This method has demonstrated 85-90 percent agreement with existing routine methods. QPCR can be used to detect other water quality indicators such as *Bacteroides thetaiotamicron* and human enterovirus. Studies indicate that ratios of *B. thetaiotamicron* may provide useful information as to fecal contamination sources.

The final rapid assessment technology methods available are the enzyme/substrate based methods. These methods pair chromogenic or fluorogenic substrate methods already widely used with advanced optical or electrical detectors. These methods are directed at reducing the incubation periods of current membrane filtration methods. Some of these methods measure excitation and absorbance of the fluorescent metabolite of Enterococci using a fluorometer to speed the detection rate. A popular type of enzyme/substrate method is called Dual-Wavelength Fluorimetry (DWF).

These rapid assessments methods are currently being tested for accuracy, sensitivity and efficiency. Research indicates that these new methods will be made available within the next five years. Once these technologies are made available and laboratories adopt the methods, beach management will have a new tool to better protect public health. With assistance from EPA Beach Grants, New Hampshire will be proactive in employing accepted methods.